» Kontron User's Guide «

KSSDP-VA

Document Revision 1.0

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1. General Description

Kontron KSSDP Professional series SSD is a high reliability and performance design solid state storage device to improve customers´ data storage experience by providing faster data transfer speed and less access time. It uses SLC & MLC NAND flash memories chips as storage media which gives the better solution against shock and vibration problem than traditional hard disk drive, also KSSDP-VA series provide customized function modular options for special applications including industry wide operating temperature, data security and data encryption.

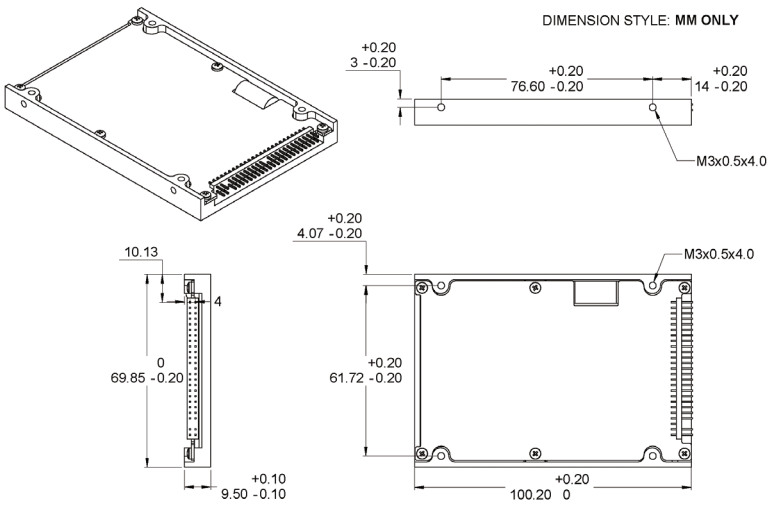
2. Features

- PATA interface
- 2.5 inch form factor
- Capacity range 16G - 256G
- 128M DDR Cache
- Stable and Sustained performance output
- High random read / write transfer rate
- Advanced wear-leveling
- Building ECC
- Advanced bad block management and flash memory management
- Extreme reliability and endurance
- F/W upgradeable

3. Customization Option

- Former factor
- Storage capacity
- Data Security Functions
  Data Fast Clear
  Data Sanitization
  DoD 5220.22-M
  NSA 130-2
  AR 380-19
  AFSSI 5020
  Navso P5239-26
  IRIG-106
  Destructive Data Erase
- Full Disk Encryption (AES128bits)
- Operating Temperature Extension
  Normal Temp : 0℃ to 70℃
  Industrial Temp : – 40℃ to 80℃
- Conformal Coating
- BGA Underfill
- MIL-STD-810 compliance report

4. Physical Dimension



Parameters	Value	Unit
Length	100.2 +/-0.3	mm
Width	69.8 +/-0.3	mm
Height	9.5 +/-0.3	mm
Weigh	80 (Max.)	g

5. Product Specification

5.1 Interface

The interface of Kontron P10P Series complies with the ATA-100.

Transfer Mode:

PIO: 0,1,2,3,4

UDMA: 0,1,2,3,4,5

5.2 Capacity

Capacity	16G	32G	64G
Total Bytes	16,000,000,000	32,000,000,000	64,000,000,000
Cylinders	16383	16383	16383
Heads	16	16	16
Sectors	63	63	63

5.3 Performance

5.3.1 Data Transfer Rate

Data Transfer Rate	Sustained .Read	Sustained Write	Unit
Sustained	85	80	MB/S

Test Setup : Intel E420 + 1G DDR2 + ASUS P5KSE Main Board

OS: Windows XP SP2

Benchmark Software: HD TACH 3.01

5.3.2 IOPS

Access Type	IOPS (IO operation per second)	
	512B	4K
Random Read	7000	4600
Random Write	630	350
Sequential Read	11000	6200
Sequential Write	12000	8400

Test Setup : Intel E420 + 1G DDRS + ASUS P5K SE Main Board
OS: Windows XP SP2
Benchmarking software: IO Meter 2006.07.27

5.3.3 Access Time

Random access time : 0.1msec
Test Setup : Intel Core Due E8400 + 2G DDRS + ASUS P5BSE Main Board
OS: Windows XP SP2
Benchmarking software: HD TACH 3.0.1.0

5.4 Reliability

5.4.1 Wear-Leveling

KSSDP-VA Series SSD applies Static, and Dynamic wear leveling algorithms to endure the NAND flash memory blocks under same wearing level.

5.4.2 ECC

Building ECC (Error Correction Code) correct 6bits per 528 Bytes

5.4.3 Endurance

Capacity	16G	32G	64G
Read	unlimited	unlimited	unlimited
Write	>50years@ 150G/day	>50years@ 300G/day	>50years@ 600G/day

5.4.4 Data Retention

Data retention above 10 years @ 25C

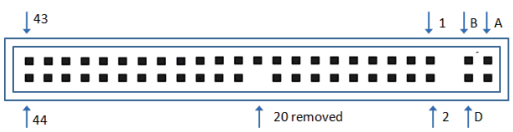
5.4.5 MTBF

MTBF (Mean Time Between Failure) > 1,000,000 Hours

5.4.6 Bad block management

Advanced the bad block management can replace the bad blocks with reserved blocks available automatically.

6. Electrical Specification



6.1 Pin Assignment

6.1.1 Reserved Pin Assignment

Pin A	Reserved for Option FUNC	Pin C	Reserved for Option FUNC
Pin B	Reserved for Option FUNC	Pin D	Reserved for Option FUNC

6.1.2 Signal Pin Assignment

Pin No.	Signal Definition	Pin No.	Signal Definition
1	RESET	2	GND
3	DD7	4	DD8
5	DD6	6	DD9
7	DD5	8	DD10
9	DD4	10	DD11
11	DD3	12	DD12
13	DD2	14	DD13
15	DD1	16	DD14
17	DD0	18	DD15
19	GND	20	removed
21	DMARQ	22	GND
23	DIOW:STOP	24	GND
25	DIOR:HDMARDY:	26	GND
27	IORDY:DDMARDY:DSTORBE	28	CSEL
29	DMACK	30	GND
31	INTRQ	32	LOCS16
33	DA1	34	PDIAG:CBLID
35	DA0	36	DA2
37	CS0	38	CS1
39	DASP/ Indicator Pin for data purge operating status	40	GND
41	+5V	42	+5V
43	GND	44	NC

6.2 Power Voltage

VDC 5V +/- 5%

6.3 Power Consumption

Status	Max Power Consumption	Unit
Idle	< 1.5	W
Operating	< 3	W

7. Data Purge Function

Kontron Data Purge is an embedded security function which was designed to meet the needs of data security concerned applications such as defense and other special purposes. Data Purge delivers reliable hi-speed data clear and sanitization with user friendly interface and auto power failure resume function.

The time required to purge a SSD depends on the actual purge mode invoked by the user and the flash memory type / flash memory configuration of the drive. A list of typical purge times of SSD is listed in Table 1.

SSD	Clear Speed	Clear Time	Sanitization Speed	Sanitization Time
32G MLC	5GB/sec	6 Secs	60MB/s	8 Mins
64G MLC	10GB/sec	6 Secs	100MB/s	10 Mins
32G SLC	6GB/sec	5 Secs	120MB/s	4 Mins
64G SLC	6GB/sec	10 Secs	120MB/s	8 Mins

7.1 Operating Principle

Clear

Clearing is the processing of erasing data on the media. In a NAND flash based SSD, this is done by executing a block-by-block erase with verify. Data Purge implements the block-by-block erase on entire physical flash blocks including user data area and reserved area for FW, spare and logical to physical mapping table. This results in all the data on media were erased and unrecoverable.

As soon as the Purge was triggered, SSD will cut off the signals transfer between Host system and SSD, stop receiving new ATA commands, and force to interrupt on-going ATA commands; and then SSD will execute block-by-block erase until all blocks in user data area were erased.

After user data area erased, if ″sanitization″ mode were invoked, SSD will follow the sanitization procedure to overwrite/fill the user data area by pre-defined pattern; if ″Clear″ mode were invoked, SSD will continue to execute erase on all vendor reserved data area, logical to physical mapping table, and firmware area. The SSD will be set back to ″blank″ with no function after ″clear″.

Sanitization

Sanitizing is the process of declassifying the drive by executing an unrecoverable removal of fall data on the media. In a NAND Flash based SSD, this initiates a sequence of block-by-block erase, pattern write and pattern verify operations designed to eliminate any trace of the original data.

KSSDP-VA provides customer standard sanitization procedure by overwriting ″1″ to all user data area after block-by-block erase. The SSD will be set back to factory default with full functions after ″Sanitization″.

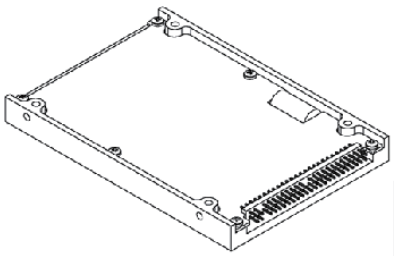
7.2 User Interface and Operating Guide

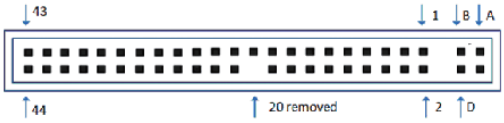
Trigger Method

The Data Purge can be triggered by various methods software trigger, hardware trigger or method combined software and hardware. A successful software trigger would depend on a functional platform which might be limited by hardware, OS, and application software used in Host system, and it is hard to guarantee the normal function of host system in emergency;

Kontron designs a system-independence in-drive hardware mechanism to deliver a simple and reliable trigger method for Data Purge function.

User Interface and Definition





Pin A	Trigger
Pin D	GND

Data Purge Interface
PATA SSD
Pitch 2mm

Pin Definition - PATA

A dedicated 2 reserved pins connector was provided for trigger switch in KSSDP-VA：

Pin A： Trigger Pin, 3.3V input, internal resistor pull-up, output was protected by series resistor. Pin A and Pin B are combined as a normal open type switch for purge trigger；

Pin D： GND

Pin 39： Indicator Pin for operating status，3.3V LVCMOS output for LED driving.

Operating Guide

The Purge function was triggered by closing and holding Pin A and Pin D switch for a given time. And LED between Pin 39 and Pin D（or GND）can show operating status – ready, operating and completion.

（1）Purge Ready, after SSD power on, the indictor LED is ON；

（2）Pre-Trigger, closing and holding the trigger switch, SSD will go to pre-trigger status, LED will flicker at 1Hz; if user releasing the switch in pre-trigger stage, the SSD will go back to (1); SSD will be triggered to Data Clear mode by holding the switch for 2 seconds ;and SSD will be triggered to Sanitization mode by holding the switch for 4 seconds or more.；

（3）User Data Erase, as soon as the commands were triggered, SSD will cut off the signals transfer between Host and SSD, stop receiving new ATA commands, and force to interrupt on-going ATA commands; and then SSD will execute block-by-block erase until all blocks in user data area were erased, then go (4), if sudden power fail, jump to (3a)

（4）Purge Mode Judgment, Data Clear mode, go（5）; Data Sanitization mode，go（6）；

（5）Erase reserved block，logical to physical mapping table, Firmware. If sudden power failed then go（5a）； After all erase operations, go（7）；

（6）Overwrite / fill erased user data area by ″1″，LED will flick，and one LED on/ff cycle means 1GB data area have been overwritten/filled. If sudden power fail then go（6a）; After overwrite / filling, go（7）；

（7）Data Purge complete，LED will be ON；SSD is set back to factory default in off-line, 10 seconds power-off should be conducted before restart the Host system and put SSD in use.

（3a）LED ON; until internal backup power used up. Power On again，jump to (3b）；

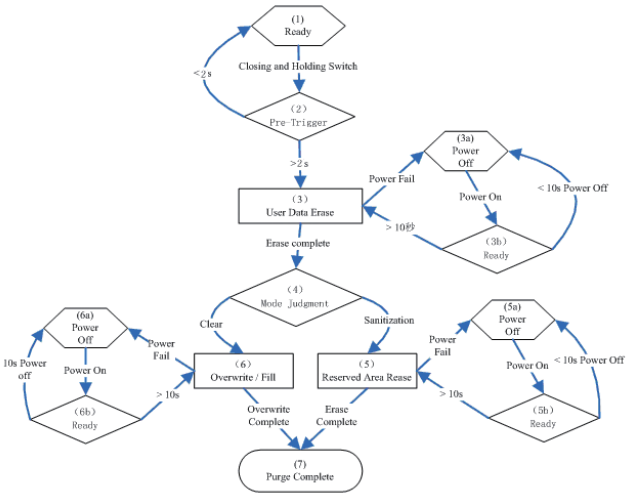
（3b）Auto resume and ready to continue. If sudden power fail again; if SSD is ready then jump to (3); if the SSD is not ready, then jump to (3a);

（5a）LED ON；until internal backup power used up. Power On again，jump to (5b）

（5b）Auto resume and ready to continue. If sudden power fail again; if SSD is ready then jump to 53); if the SSD is not ready, then jump to (5a)；

（6a）LED On; until internal backup power used up. Power On again，jump to（6b）；

（6b） Auto resume and ready to continue. If sudden power fail again; if SSD is ready then jump to (6); if the SSD is not ready, then jump to (6a);



Status Changing Diagram

7.3 Options

Data Purge is a flexible modular design, and can provide following options which can be customized to meet various applications.

（1）Trigger Time, can be changed more or less, default setting is 2 seconds；

（2）Trigger Mode Setting, the default Data Clear Trigger is defined as holding switch for 2 seconds, and holding time over 4 seconds is defined as Data Sanitization. The actual settings can be adjusted by customer requirement.

（3）An in-drive back-up power system have been provided as default, so the SSD can keep working well and auto resume during and after sudden power fail. Also Kontron provides customer option to enhance the back-up power by adding more extra back-up power which is strong enough to support the energy used for erase entire disk area in emergency.

（4）Kontron can provide pre-defined pattern for data overwrite / fill, default setting is ″1″, by customer requirement, the pattern can be defined to comply with third party standards in following list or customer spec.

DoD 5220.22-M
NSA 130-2
AR 380-19
AFSSI 5020
Navso P5239-26
RIG-106

8. Environmental Specification

8.1 Temperature

Status	Temperature	Unit
Operating	0 to +70˚C Extended Temp -40˚C to +80˚C	Degree C
Non-Operating	-40˚C -+80˚C Extended Temp -45 ˚C to +85˚C	Degree C

8.2 Humidity

Parameter	Humidity	Unit
Operating	5-90	%

8.3 Shock

Parameter	Force	Unit
Operating	2000	G

8.4 Vibration

Status	Parameter	Unit
Operating	20G Peak 20-15KHZ with 3 Axis	G

8.5 Altitude

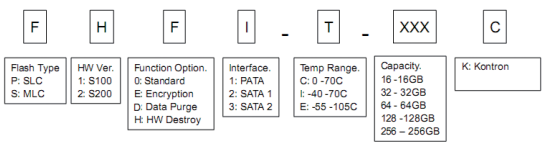
Status	Parameter	Unit
Operating	-1000 - 15000	feet

9. Production ordering information

9.1 Ordering Part.-NO.

Article	Part.-No.	Description
KSSDP-VA	KSSD-P-M000032-01A	2.5" IDE compatible 32GByte SSD with MLC Flash
KSSDP-VA	KSSD-P-M000064-01A	2.5" IDE compatible 64GByte SSD with MLC Flash
KSSDP-VA	KSSD-P-M000128-01A	2.5" IDE compatible 128GByte SSD with MLC Flash
KSSDP-VA	KSSD-P-M000256-01A	2.5" IDE compatible 256GByte SSD with MLC Flash
KSSDP-VA	KSSD-P-M000032-01C	2.5'' IDE compatible 32GByte SSD with MLC Flash, extended temperature -40˚C to 70˚C
KSSDP-VA	KSSD-P-M000064-01C	2.5'' IDE compatible 64GByte SSD with MLC Flash, extended temperature -40˚C to 70˚C
KSSDP-VA	KSSD-P-M000128-01C	2.5'' IDE compatible 128GByte SSD with MLC Flash, extended temperature -40˚C to 70˚C
KSSDP-VA	KSSD-P-M000256-01C	2.5'' IDE compatible 256GByte SSD with MLC Flash, extended temperature -40 to 70˚C
KSSDP-VA	KSSD-P-M000016-02C	2.5'' IDE compatible 16GByte SSD with SLC Flash, extended temperature -40˚C to 85˚C
KSSDP-VA	KSSD-P-M000032-02C	2.5'' IDE compatible 32GByte SSD with SLC Flash, extended temperature -40˚C to 85˚C
KSSDP-VA	KSSD-P-M000064-02C	2.5'' IDE compatible 64GByte SSD with SLC Flash, extended temperature -40˚C to 85˚C
KSSDP-VA	KSSD-P-M000128-02C	2.5'' IDE compatible 128GByte SSD with SLC Flash, extended temperature -40˚C to 85˚C

9.2 Product function code



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